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Further Observations on Traumatic Reticulitis and Bloat in Cattle*

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THIS contribution is complementary to a previous publication (Williams, 1955) based mainly on further observations in practice. Before dealing with the conditions described in the title of this paper a brief reference to present knowledge of fore-stomach motility in normal adult cattle is necessary.

Fore-stomach Motility

Examination of the reticulum in the intact animal is difficult (even by auscultation), due to its small size and relatively inaccessible position in the anterior region of the abdominal cavity. The rumen, on the other hand, occupies almost the whole of the left side of the abdominal cavity and may be examined by auscultation, percussion and palpation. Previous observations (Williams, 1955) have shown that, by a combined system of auscultation and palpation, the motility of the reticulum may be correlated with that of the rumen, the cycle of motility in the majority of normal adult cattle being as follows :—

(*a*) A contraction of the reticulum, the second stage of which is accompanied by a ruminal contraction, the latter reaching its maximum movement as the reticulum relaxes. Eructation of ruminal gases does not occur at this stage because the cardia region is flushed with stomach ingesta. The rumen then relaxes.

(*b*) After a slight pause, an independent ruminal contraction occurs, *accompanied by eructation*. The reticulum remains relaxed during this period, the cycle being completed when the rumen relaxes.

Variations in rhythm occur in some animals even on the same diet. Nevertheless, the rhythm of motility can easily be identified by observation at the left flank, the two types of ruminal movements being distinguished by the presence or absence of eructation. The clinician must acquaint himself with the fact that reticular contraction begins about two to three seconds before the primary ruminal movement. A knowledge of this time relationship is vital in the diagnosis of traumatic reticulitis.

Traumatic Reticulitis

Just over a decade in veterinary practice has impressed upon the writer the need for correct diagnosis as early as possible. This is particularly so with the condition known as traumatic reticulitis, familiar to all veterinary surgeons in cattle practice.

Cattle fall victims to this ailment because of their " unselective " method of food intake and the peculiar arrangement of their fore-stomachs. On being swallowed, foreign bodies fall into the reticulum (Phillipson, 1946). More recently, Kingrey (1955) recorded the results of obsevations on 10 cows, to each of which was administered a capsule containing (*a*) two pieces of wire pointed at one end and made into a loop at the other ; (*b*) one " eight penny " nail. These animals were carefully examined at regular intervals until symptoms of traumatic reticulitis appeared. On the average initial symptoms were noted 30 hours after the capsule was given. Rumenotomy 48 hours later revealed :—

(*a*) 25 objects (20 wires, five nails) in the reticulum.

(*b*) Five nails in the rumen (two in the ventral sac and three in the anterior dorsal sac).

All the wires, except one, were found to be penetrating the reticular wall, but only one nail was so engaged. No reference was made to the point of penetration.

The present writer has hitherto encountered 97 cases in which penetration was as follows :—

Anterior wall 33 ; Ventral wall 58 ; Posterior wall 6. No correlation was found between the onset of symptoms and the stage of pregnancy.

Symptoms and Diagnosis

Penetration of the reticular wall by a pointed foreign object sets up an area of inflammation in the surrounding

*A paper presented to a meeting of the Mid-West Division at Bristol on Friday, April 20th, 1956.

peritoneal covering, usually of a localised sero-fibrinous type, resulting in fibrinous adhesions between the reticular wall and the adjacent organs at this point. Owing to the remarkable resistance of the bovine peritoneum to infection, it is only on very rare occasions that diffuse peritonitis accompanies this ailment. Nevertheless, the close proximity of the reticulum to the pericardium and other vital organs emphasises the need for the early diagnosis and treatment of traumatic reticulitis.

Careful records have been kept of all the cases encountered by the writer during the last five years. An analysis revealed that they form two distinct clinical groups comprising :—

(*a*) The large majority of cases, most of which were visited within 12 hours of the onset of symptoms, which showed a remarkably constant clinical picture. Following a history of sudden disinclination for food, not ruminating, and a marked drop in milk yield (if lactating), a general examination revealed the patient standing with an arched back, respirations slightly accelerated but shallower (due to the fixation of the diaphragm) ; pulse 70 to 75 per minute and the temperature closely in the region of 102·5° F. When patients were taken outdoors, there was obvious stiffness on exercise, with a tendency to " fix " the fore-quarters, the latter being especially noticeable when the animal was made to turn sharply.

Close examination of the rumen showed that motility was usually retarded, whilst tympany was only encountered in the *history* to four cases. On each occasion, the " reticular grunt " test was applied and found to be extremely reliable. This test, which has been described in detail previously (Williams, 1955), is based on the correlation of pain with reticular motility. In a positive case, a grunt may be heard two to three seconds before and/or during *the primary ruminal contractions* by observing the latter at the left flank. In all the cases comprising this group, the grunts were detected with ease and a definite diagnosis was submitted immediately in each case.

Reproduction of a grunt by the application of other tests, such as pinching the withers, percussion of the xiphisternal region, or digital pressure at the sixth and seventh intercostal spaces was not satisfactory.

(*b*) This group may be sub-divided into :—

Cases which showed only vague signs of ill-health at the onset.

Those which had a *history* of a sudden onset with acute symptoms but in which professional advice was sought 24 to 48 hours afterwards.

Examination of cases in this group revealed a fairly normal posture, variable appetite, occasional rumination, slight drop in milk yield, more or less normal temperature, respirations and pulse rate, little stiffness on exercise. It was also noted that the " reticular grunts " were often faint or apparently absent, especially if the fore-stomachs were relatively empty. In the latter cases, taking the animal outdoors for brisk exercise and/or enticing it to partake of food or water (to stimulate motility) was found to be an effective method of reproducing the grunts. It must be emphasised that, in these vague cases, very keen observation over a considerable period may be necessary and it is suggested that the grunts, which sometimes may only be muffled expiratory sounds, will be more readily detected now that the clinician knows exactly when to expect to hear them.

The writer considers that a definite diagnosis should be submitted on the first visit, for a further examination of an acute case after complete starvation for 24 hours or so will nearly always reveal an apparently normal animal. Grunting can be reproduced in such cases (as described earlier), but the client may take a lot of convincing !

Wynne (1956) found the " reticular grunt " test to be completely reliable in a series of 65 cases. It is interesting to note that a metal detector had shown a negative result in two of these cases. Lloyd (1956) has applied this method of diagnosis in all suspected cases during the last two years and considers it to be the only reliable diagnostic test for traumatic reticulitis. The latter author has also observed that animals in which rumenotomy revealed penetration of the upper region of the anterior reticular wall, showed only mild initial symptoms. Two of these animals later developed traumatic pericarditis. The present writer has also noted this correlation on some occasions recently. Reference to the literature showed that Lagerlof (1929) cited Wester as follows : " We must take into consideration that pain reaction caused by reticular contractions in connexion with traumatic reticulo-diaphragmatis probably depends to some degree on the spot in the reticular wall through which the foreign body has made its way and also on alterations in the peritoneum brought about by the perforation. In this connexion, Wester communicates a very interesting observation made in cows with rumen fistula. He found that foreign bodies which made their way through the wall of the reticulum in the dorsal or central part of the organ did not occasion any pain reaction in the animal, nor, in ordinary cases, did they lead to any serious complications. Wester, therefore, seems as though he wished to refer that part of the peritoneum which clothes the abdominal surface of the diaphragm to visceral peritoneum which consequently should be relatively insensible to pain as compared with the parietal." Lagerlof found by internal palpation that, whilst the ventral reticular wall showed considerable movement, the upper and middle parts of the anterior wall still rested, on the whole, against the diaphragm with little displacement. The present writer agrees with the latter findings, which probably account for the mild symptoms accompanying high anterior wall penetration.

The Sulkowitch Test

Hall (1956) drew attention to an " on the spot " urine test which had been suggested by Silver (1951), based on the absence of calcium in the urine of a positive case. The Sulkowitch reagent consists of the following : oxalic acid—5·0 grammes ; ammonium oxalate—5·0 grammes ; glacial acetic acid—10·0 c.c. ; distilled water to 300 c.c.

Five c.c. reagent, when added to 5 c.c. urine from a normal animal, should give a milky-white reaction, whereas in a positive case of traumatic reticulitis there should be very little visible change. This test was recently applied to 10 positive cases by the present writer, and on each occasion a negative reaction was obtained, *i.e.* no turbidity was observed. Normal cows in the same herds were also examined and most of them gave

similar results. It should be stated that the tests were all applied during the late winter months which *might* account for the negative calcium urine results in the normal animals.

Treatment

Only a brief reference to this section is considered necessary since it has been adequately covered in various publications. Suffice it to be repeated that rumenotomy, which is a simple, straightforward operation, should be performed in all uncomplicated cases. Most offending objects were located with ease in the present series, except when small pieces of fine wire were incriminated. In such cases, a finger magnet would have been useful. On two occasions, no foreign bodies were recovered in spite of a prolonged search at the points of penetration, digital pressure at which produced a grunt in each case. Both animals showed no further complications, penetration having been through the ventral wall.

The ruminal wall was sutured in all cases by a single continuous Lembert suture. No. 4 catgut was used originally but Nos. 1 or 2 are now used, with satisfactory results having been obtained with No. 0 catgut in certain emergency cases.

No special after-treatment is now given, and it is only on very rare occasions that the patient is re-visited before the skin-muscle sutures are removed on the seventh or eighth day.

BLOAT

Bloat is characterised by the retention of ruminal gases, giving rise to a distension of the abdomen, often resulting fatally. It is certainly not new, having been described by a Roman writer in A.D. 60, who referred to treatment by " pouring sour vinegar through the left nostril and putting two ounces of grease in the jaws " (Dougherty, 1953).

Two types of bloat may be recognised in practice : tympany of the rumen which is characterised by a large pocket of gases in the dorsal sac ; frothy bloat, in which the ruminal and reticular contents are churned up into a frothy mass with isolated gas pockets. Tympany of the rumen due to an oesophageal obstruction caused by an enlarged mediastinal gland or food material, *e.g.*, potato, is not included in this classification.

In Britain the incidence of bloat increased considerably during the second World War, due to the vast increase in the ley system of farming. Menzies (1952) stated that " the majority of the cases of bloat in England and Wales in 1951 occurred on young, actively growing pasture with a high clover content ; but on a few farms permanent pastures rich in clover were also involved."

The present writer has a vivid recollection of the condition at his home farm, where no ploughing had been carried out for many years until the outbreak of war in 1939. From then, each field was cultivated in turn for corn, kale, etc., and then re-seeded. In one fresh ley, in 1944, 10 of the milch cows were found to be severely bloated within 30 minutes of being turned on to the pasture, two animals being found dead. There was no history of bloat having occurred on the farm previously. A few sporadic cases have been encountered in subsequent years, the pasture now being of the permanent type.

Another example of the correlation of bloat with the diet was found recently. A client had a particularly good crop of barley, so he replaced part of the concentrate ration with this product, some of the heavier milkers being given up to 5 lb. rolled barley twice daily. Three animals died of bloat on various days even though different pastures were used. When the barley ration was withdrawn, no further cases occurred.

It is interesting to note that Mead, Cole & Regan (1944), found that lactating cows were more susceptible to bloat formation than dry cows. They recorded that, over a 12-day period, the average amount of alfalfa consumed by a dry cow during the first two hours at pasture was 19·4 lb. compared with 43 lb. by a lactating cow. They found that it was safe to leave the animals if bloat had not developed *one* hour after they were taken off the pasture.

A large proportion of the cases encountered by the present author were in high yielding cows early in lactation, and were mostly of the frothy type. Sporadic cases were met when kale, rape and even hay had been fed ; but most cases occurred on fresh leys in spring time, or aftermath in the autumn. Menzies (1952) maintained that bloat is more common on quick growing herbage influenced by weather conditions. The possibility of bloat being a hereditary condition has been referred to by Weiss (1953).

Aetiology

Whilst the causation of bloat is still unsolved, many theories have been put forward by various authors. It is impossible to cover all these in this paper, but some of the most interesting are as follows :—

Excess gas formation in the rumen. It is now generally accepted, however, that provided the eructation mechanism is functioning normally, cattle are capable of eructating gases far in excess of amounts normally produced (Cole *et al.*, 1945).

Lack of coarse fibre in the diet was suggested by Cole *et al.* (1942) as the chief cause of bloat arising from legume pastures. These authors also maintained that eructation was brought about by mechanical stimulation of the anterior dorsal ruminal sac by coarse material in the diet. Clark & Weiss (1952) demonstrated that the lack of coarse material diminished reflex salivary secretion and that the consistency of the ruminal ingesta was dependent upon salivary secretion. It was considered that the greater the salivary secretion, the less was the tendency for froth formation. The protective action of hay was believed to be due to its reflex stimulation of salivary secretion thus reducing the consistency of the ruminal ingesta and obviating froth formation.

The Saponin theory. Saponins, which are found in various plants and legumes, were considered by Quinn (1943) to play an important part in the pathogenesis of frothy bloat by decreasing the surface tension so that the gases from fermentation tended to accumulate in countless bubbles throughout the ingesta instead of rising to the dorsal rumen as a gas pocket. Weiss (1953) believed that the presence of saponins in lucerne is not the cause of bloat *per se*, but that it merely contributes towards the colloidal state of the ingesta favourable for foaming.

The production of toxic substances in the rumen has been referred to by several authors in relation to bloat production. Evans & Evans (1949) incriminated hydrocyanic acid isolated from clover juice as a causative factor in bloat, whilst a toxic flavone has been isolated from legume juice by Ferguson *et al.* (1949). More recently Dougherty (1953), referring to a hypothesis put forward by Lienert, stated that " the bacteria-free rumen filtrate is very high in phosphatase and phosphate is high in plants that produce bloat. Increased gas formation in bloat could be caused by increased phosphatase or by an increase in arsenates which are high in plants that cause bloat. Arsenates stimulate phosphatase activity. The salivary source cannot account for all the phosphatase in rumen ingesta."

Bloat associated with allergic reaction has been described by Kerr & Lamont (1946), and Lamont (1946), whilst Hughes (cited by Menzies, 1953) encountered two cases following the intravenous injection of glucose. The present writer has also observed a similar condition after administrating glucose *via* the same route.

Treatment and Prevention

The disheartening feature about bloat in practice is that so many animals are dead before relief can be given. In ordinary tympany, passing a stomach tube or puncturing the rumen at the left flank will usually give satisfactory results. In acute frothy bloat, drastic measures by rumenotomy have to be carried out without delay, with the evacuation of a considerable quantity of the frothy ruminal contents. Following the latter measures, normal motility, with regular eructation, may be observed within a few hours.

Various forms of medicament have been administered for subacute frothy bloat, such as turpentine and the silicone preparations *per os*, the latter having also been injected directly into the rumen. These products have been widely recommended because of their surface tension increasing properties.

Parenterally, several proprietary anti-histaminic preparations have been used. In the writer's experience the results following medicinal treatment have been variable, and in those cases in which recovery occurred, it was difficult to assess the true value of the treatment given.

Giving cattle a feed of hay before turning them on to pasture has been suggested as a preventive measure. This method, however, is unreliable, because most cattle will refuse hay after being turned out in spring. Recent trials in New Zealand have given promising results by spraying anti-foaming agents directly on to the pasture, using arachis or peanut oil, emulsified tallow and cream (from milk), at the rate of 2 to 3 oz. oil or fat per cow (Sears & Reid, 1955).

Discussion

The great difficulty with bloat research is that, as far as the author is aware, the condition has not been reproduced experimentally with all its clinical manifestations. Research workers are, therefore, at a great disadvantage. The clinician, on the other hand, is better placed to record vital observations which might help to solve this intricate problem. An even more disturbing feature is that present knowledge of fore-stomach physiology is far from satisfactory. It is known that the following sequence of events occur in eructation.

Clearing of the cardia region by a two-phase reticular contraction, during which the reticular ruminal fold is raised, thus acting as a barrier preventing ruminal ingesta from flowing back into the reticulum.

Relaxation of the relatively empty reticulum, followed by an extra-ruminal contraction which forces the ruminal gases into the cardia region.

Opening of the cardia during the latter contraction.

The following factors, however, have yet to be determined :—

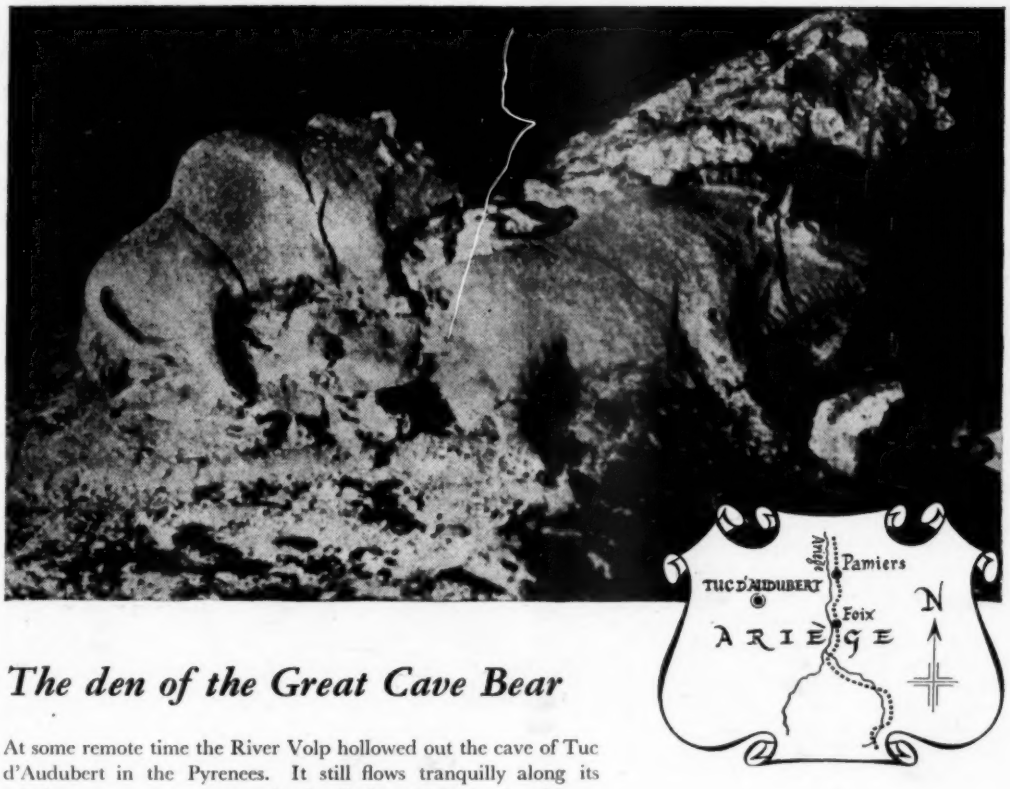
What is the stimulus for eructation? Are the pressure receptors located in the anterior or posterior dorsal ruminal wall, or within the " relaxed " cardia region? Do the extra-ruminal contractions originate at the transverse fold or the posterior dorsal ruminal sac, and what is their precise function (or functions)? What factors influence gas production and its release from the rumen ingesta? What is the innervation of the lower oesophagus and cardia region? To what extent is fore-stomach motility controlled centrally? In bloat, is death due to mechanical interference with respiration and circulation, or to the absorption of toxic substances from the rumen, or both?

Manual exploration of the reticulo-ruminal sac in two cases of acute frothy bloat revealed normal primary movements whilst the extra-ruminal contractions were absent (Williams, 1955). The writer has recently encountered a subacute case which persisted for three days before rumenotomy was performed. During this period, eructation was only observed at very infrequent intervals. A prolonged exploration of the fore-stomach showed normal motility, *with each extra-ruminal contraction accompanied by " relaxation " of the cardia.* Eructation did not occur during this examination because of the absence of free ruminal gases in the cardia region. When visited on the following day, the animal had a good appetite with a 1 : 1 ruminal motility, and eructated regularly.

These findings contradict the previous observations, but it is significant that the writer's original thesis (1954) stated : " The cardia remained closed during the reticulo-ruminal contraction but was relaxed for a short interval during the static period, *i.e.* the time when the extra-ruminal contraction would normally have taken place." (It is possible that the extra-ruminal contractions did occur in a weakened form in this case, and that the writer was not sufficiently experienced to detect them).

When it is recalled that eructation does not occur in the presence of a ruminal fistula (except when the latter is occluded by ingesta), it seems that the primary function of the extra-ruminal contractions is to ensure a thorough mixing of the food material and the micro-organisms in the rumen, with the expulsion of gases a subsidiary, yet highly necessary, function. It also seems that eructation follows the reflex stimulation of the " relaxed " cardia by a pocket of gases in this region.

The final elucidation of this intriguing problem of bloat obviously rests on further knowledge of the normal animal.



The den of the Great Cave Bear

At some remote time the River Volp hollowed out the cave of Tuc d'Audubert in the Pyrenees. It still flows tranquilly along its echoing course past a network of galleries which, in the gloomy recesses some yards from the entrance, open out on either side. When explored in 1912 these galleries, glittering with stalagmitic encrustations, showed many traces of the great Cave Bear: the impression of its coat in the clay hollows where it had slept and the marks of its paws. There were even finger-prints left by men of the Reindeer Age—the men who sculpted these remarkable models of bison. The wet clay soon hardened and preserved the shape of the prehistoric bison for all time—while outside the cave, animals were undergoing many evolutionary changes.

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REFERENCES : Brit. Med. J. 1954, **2**, 17.
Nord Med. 1953, **10**, 362.
Lancet, 1955, **1**, 200.
Vet. Rec. 1955, **67**, 317.

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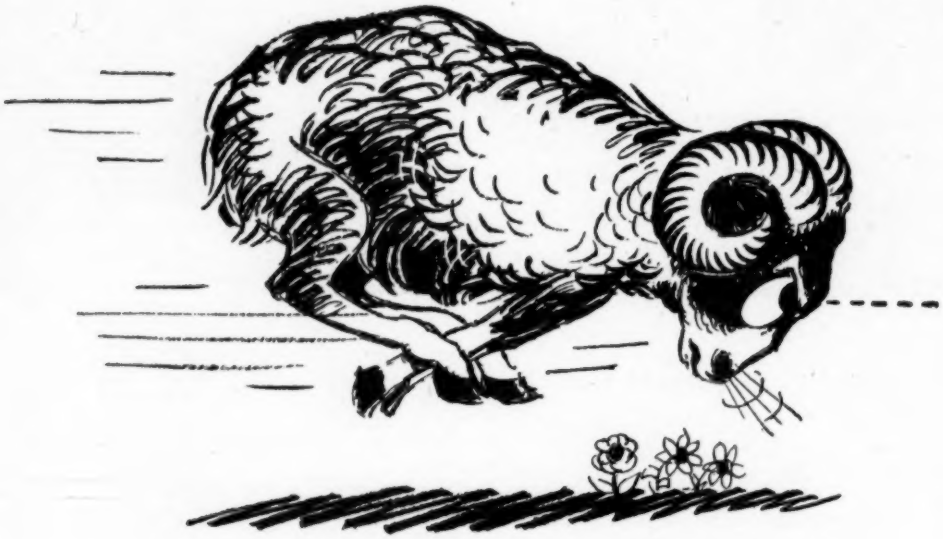

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Summary

Further observations are recorded on traumatic reticulitis, and bloat, in cattle, as encountered in practice.

The clinical interpretation of the two types of ruminal movements and its importance in the diagnosis of traumatic reticulitis is emphasised.

An analysis of 97 cases of traumatic reticulitis revealed that they fall into two clinical groups.

The diagnostic value of the "reticular grunt" test has been proved in a further series of cases.

A classification of bloat into two clinical types is given, with reference to some of its features in practice.

Some of the most likely causes of bloat are reviewed, together with the sequence of events in eructation.

The need for further knowledge of normal forestomach physiology in adult cattle is stressed.

References

CLARK, R., & WEISS, K. E. (1952). *J. S. Afr. Vet. Med. Ass.* **23.** 163.

COLE, H. H., MEAD, S. W., & KLEIBER, M. (1942). Univ. of California; College of Agric; Agric exptl. Station, Berkeley, California. Bulletin 662; 3.

———, HUFFMAN, C. F., KLEIBER, M., OLSON, T. M., & SCHALK, A. F. (1945). Fourth Report of the Committee on Animal Health of the National Research Council.

DOUGHERTY, R. W. (1953). *J.A.V.M.A.* **122.** 345–52.

EVANS, W. C., & EVANS, E. T. R. (1949). *Nature.* **163.** 373.

FERGUSON, W. S., ASHWORTH, DE. B., & TERRY, R. A. (1949). *Ibid.* **163.** 606.

HALL, S. A. (1956). *Vet. Rec.* **68.** 88.

KERR, W. R., & LAMONT, H. G. (1946). *Ibid.*. **58.** 6.

KINGREY, B. W. (1955). *J.A.V.M.A.* **127.** 945.

LAGERLOF, N. (1929). *Skandinavisk Veterinar-Tidskrift.* **19.** 253–365.

LAMONT, H. G. (1946). *Vet. Rec.* **58.** 520.

LLOYD, W. H. (1956). Private communication.

MEAD, S. W., COLE, H. H., & REGAN, W. M. (1944). *J. Dairy Sci.* 27.

MENZIES, D. W. (1952). Report of Conference on Metabolic disorders and other problems related to Grassland and Fodder Crops. B.V.A. Publication, No. 23.

PHILLIPSON, A. T. (1946). *Vet. Rec.* **58.** 81–4.

QUINN, J. (1943). *Onderstepoort J.* **18.** 113.

SEARS, F. D., & REID, C. S. W. (1955). *N.Z. Dairy Exptr.* Sept. 1st, 51–7.

SILVER, J. (1951). *N. Amer. Vet.* **32.** 829.

WEISS, K. E. (1953). *Onderstepoort J.* **26.** 2. 241–50 and 251–83.

WILLIAMS, E. I. (1955). *Vet. Rec.* **67.** 907 and 922.

———. (1954). R.C.V.S. Fellowship thesis.—R.C.V.S. Library.

WYNNE, M. (1956). Private communication.

PROCEEDINGS OF CONGRESS

THE VETERINARY RECORD next week will be published in two parts. The first will be the normal weekly issue, and the second will contain the full set of papers read at the 1956 Annual Congress, together with the Discussions.

BOOKS RECEIVED

The following books have been received: *The Physiology and Biochemistry of Lactation*, by S. J. Folley; *The Rabbit*, by Harry V. Thompson and Alastair N. Worden; *The African Veterinary Handbook*, by P. Z. Mackenzie and R. M. Simpson; *Animal Diseases in South Africa*, by M. W. Henning, and *Milchkurde and Milchhygiene*, by F. Schönberg.

The Treatment of Chronic Carriers of *Salmonella gallinarum* with Furazolidone

BY

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RECENT studies by Grumbles *et al.* (1954) and Harwood & Stunz (1954) in America, and by Williams Smith (1954, 1955) and Wilson (1955) in this country, have shown furazolidone to be of considerable value in the treatment of experimental *Salmonella gallinarum* infection in chickens and turkey poults.

The drug was also found to be useful in reducing the mortality in field outbreaks of fowl typhoid (Cosgrove, 1954; Harwood & Stunz, 1954; Lucas, 1955; Harbourne & Sellers, 1955).

In discussing the results of their trials, Harbourne & Sellers (1955) suggested that furazolidone might be of value in eliminating *S. gallinarum* infection from carrier birds, as has been shown to occur in the case of pullorum disease (Gordon & Tucker, 1955). This paper gives the results of a small-scale trial designed to assess the usefulness of the drug in this respect.

Materials and Methods

Forty-one birds were obtained from 14 farms where fowl typhoid was known to exist. At the time of collection all birds were positive to the rapid whole-blood plate test with a *S. pullorum* stained antigen.

The duration of infection varied from 2 to 18 weeks, and apart from three cockerels and a four-month-old pullet, the birds were either hens in their second year or pullets which had reached maturity. Most of the birds were the usual light-heavy crosses maintained for commercial egg production.

The birds were divided into two groups and placed in identical all-metal fold units, which were moved daily.

One group of 20 birds was fed exclusively on a commercial layers' mash containing 0.04 per cent. furazolidone for a period of 12 days. The remaining 21 birds were fed on the same mash without the drug, and constituted the untreated group. At the start of the trial all birds were blood tested both by the rapid method and by a tube agglutination test, the antigen for the latter being prepared from a recently isolated strain of *S. gallinarum*. Further blood tests were performed on the 13th day after the start of the trial, when approximately half the birds of each group were destroyed. The remaining birds were killed on the 21st day after a final blood test.

Cloacal swabs were taken at the time of the blood tests. These were placed into selenite broth and after incubation at 37° C. for 24 hours, subcultures were made on to bile salt citrate agar plates (Difco S. S. agar). These plates were incubated at 37° C. for 24 hours and examined for *S. gallinarum*. After the birds were slaughtered the same technique was used in examining the following organs, the whole of the ovary or testes, a portion of the liver, the whole of the gall bladder and its contents, and some

of the duodenal contents. In addition, a direct culture of the liver was made on to nutrient agar. A further portion of the liver and the remainder of the duodenal contents were seeded into tetrathionate broth, and after incubation for 24 hours at 37° C., subcultures were made on to bismuth sulphite agar plates. These were examined for *S. gallinarum* after incubation at 37° C. for 24 hours.

The organs were removed with aseptic precautions and unless otherwise stated, the liver and gonads were first ground up with sterile sand in a pestle and mortar.

Results

The effect of treatment on the recovery of S. gallinarum

Four days after the start of treatment, one bird in the treated group died. This was an 18-month-old hen and the duration of infection was approximately two weeks. *S. gallinarum* was recovered from the ovary.

On the 13th day, 9 treated and 11 untreated birds were killed. *S. gallinarum* was recovered from two treated and five untreated birds. The organism was recovered from the ovary, liver, gall bladder, and duodenal contents of one treated bird, and from the duodenal contents and gall bladder of the other. In the case of the five untreated birds, isolations were made from the liver and duodenal contents, the gall bladder and duodenal contents, and from the duodenal contents, the liver, and the gall bladder respectively.

Except for the one treated bird which was actively in lay, no other isolations were made from the ovaries. This may have been due to the method of examination, which in the majority of cases did not include trituration of the ovary before placing into selenite broth.

On the 21st day after the start of treatment the remaining birds were killed. *S. gallinarum* was recovered from 3 out of 10 treated birds and from 9 out of 10 untreated birds.

The site of isolation in the treated birds was restricted to the ovary in contrast to the untreated group, in which seven ovarian isolations were made, in addition six isolations were made from the gall bladder and five each from the liver and duodenal contents.

The results of the bacteriological findings are given in Table I.

The effect of treatment on the blood test

There was a tendency for the blood agglutination titres of most birds to fall during the course of the trial, whether they had been treated or not, but this was more marked in the treated group. The tube agglutination test and the rapid test showed a close correlation, consequently only the results of the latter are given (Table II).

On the 13th day only 18 birds were tested out of an original total of 20. One bird died before the test and one was omitted in error, but was included in the next test on the 21st day.

TABLE I
BACTERIOLOGICAL FINDINGS—GROUP KILLED AT 21 DAYS

Bird No.	Duration of disease before slaughter (weeks)	Organ Isolations: Ovary or testes	Liver	Gall bladder	Duodenum	Condition of ovary or testes
Treated						
*1	21	+	−	−	−	O.D.
2	11	+	−	−	−	O.D.
4	11	−	−	−	−	O.I.
7	9	−	−	−	−	O.I.
9	8	−	−	−	−	O.A.
11	8	−	−	−	−	O.D.
12	8	−	−	−	−	O.I.
14	7	−	−	−	−	O.I.
16	6	+	−	−	−	O.D.
18	6	−	−	−	−	O.I.
Untreated						
22	11	+	+	+	+	O.I.
27	9	−	−	−	−	O.I.
28	9	+	+	+	+	O.D.
29	8	+	+	+	−	O.D.
31	8	+	+	−	−	T.H.
32	8	+	−	−	+	O.D.
33	7	+	−	+	+	O.I.
35	7	−	+	+	+	T.S.
36	6	+	−	−	−	O.D.
40	5	−	−	+	−	O.R.A.
Totals :—						
Treated	10	3	0	0	0	
Untreated	10	7	5	6	5	

O.D. = Degenerated ovules in ovary
O.A. = Ovary active
T.S. = Testes small
O.I. = Ovary inactive
T.H. = Testes hyperaemic
O.R.A. = Ovary recently active.

* Bird showed lesions of tuberculosis.

S. gallinarum was recovered from 6 out of 16 birds in the treated group, and from 14 out of 19 in the untreated group, which had given either a positive or doubtful reaction at the time of death. In no case was the organism recovered from a bird which had given a negative reaction.

Recovery of the organism from cloacal swabs

All samples gave negative results with the exception of two cloacal swabs taken from birds 29 and 35 on the 13th day. Both birds were in the untreated group.

TABLE II
RESULTS OF THE RAPID WHOLE BLOOD PLATE TESTS

	Positive	Doubtful	Negative	Total birds tested
Treated				
1st day	18	2	0	20
13th day	10	7	1	18
21st day	3	4	3	10
Untreated				
1st day	18	3	0	21
13th day	15	3	3	21
21st day	7	2	1	10

("Doubtful" was restricted to those reactions which appeared two minutes or more after mixing the stained antigen with the blood.)

Discussion

There is insufficient evidence to suggest that furazolidone given in the mash reduced the burden of infection in the birds killed the day after treatment had ceased.

The indications are, however, that the drug did reduce the infection in the treated birds which were allowed to live a further eight days. Nevertheless, three of these birds remained carriers of *S. gallinarum*.

Hobson (1956) in his study of the treatment of experimental mouse typhoid with furazolidone found that the drug failed to eradicate infection from 8 of the 16 mice which were in the chronic carrier state. He suggested that the reduced efficiency of the drug in the established disease might be due to the changed environment of the organisms. Thus in infection of five days' duration, treatment rapidly eradicated *S. typhi-murium* from all organs except the liver and spleen where small abscesses or necrotic foci were present and in which there were intracellular organisms presumably less accessible to furazolidone.

A similar explanation might account for the recovery of *S. gallinarum* from the three treated birds. The site of isolation was restricted to the ovary, which in each case had undergone pathological changes of a chronic character.

The results of the blood tests and the bacteriological examination of cloacal swabs cannot be regarded as significant; the number of birds involved in the trial was small and all of them were killed shortly after treatment was completed.

Since most of the birds were hens in their second year of lay, or pullets which had reached maturity, particular attention was paid to the condition of the ovaries. Reference to the last column of Table I shows that pathological changes had occurred in 4 out of 10 of the ovaries of the treated birds and in 4 out of 8 of the untreated ones. At the time of the first killing the ovaries of 10 birds, including the bird which died, were found to contain degenerated ovules. This suggests that a number of reactor birds are likely to be suffering from a chronic form of fowl typhoid in which the ovary is involved, and consequently egg production would be severely affected.

The treatment of chronic carriers of fowl typhoid with 0.04 per cent. furazolidone given in a mash for 12 days, cannot be recommended owing to possible irreversible changes which would have occurred in the ovaries before treatment was instituted leading to poor egg production and because, despite treatment, one-third of such birds might remain carriers of *S. gallinarum*.

Summary

Furazolidone given in a mash at a concentration of 0.04 per cent. for 12 days reduced the rate of infection with *S. gallinarum* in a small group of birds, which had given a positive reaction to the rapid blood test, although some of the treated birds remained carriers. The value of such treatment is discussed.

Acknowledgments.—I wish to express my sincere thanks to Mr. D. Hunter, A.I.M.L.T., for his capable technical help. I am also grateful to Dr. K. C. Sellers for his encouragement and valuable advice during the course of the work and afterwards for his criticism of the paper. Thanks are also due to Mr. H. I. Field and Dr. H. Williams Smith for further criticisms, and to Messrs. A. J. White Ltd. for the supply of furazolidone.

ADDENDUM

Since this paper was submitted for publication, one by Wilson, J. E. (1956), on the same subject has appeared in this journal.

The results of both series of experiments show a large measure of agreement.

References

COSGROVE, A. S. (1954). *Vet. Med.* **49.** 393.
GORDON, R. F., & TUCKER, J. (1955). *Vet. Rec.* **67.** 116.
GRUMBLES, L. C., WILLS, F. K., & BONEY, W. A. (1954). *J. Amer. Vet. Med. Assoc.* **124.** 217.
HARBOURNE, J. F., & SELLERS, K. C. (1955). *Vet. Rec.* **67.** 799.
HARWOOD, D. P., & STUNZ, D. I. (1954). *Proc. Xth World Poult. Cong. Edin.* **2.** 222.
HOBSON, D. (1956). *Brit. J. Exp. Path.* **37.** 20.
LUCAS, F. R. (1955). *Poult. Sci.* **34.** 440.
SMITH, H. WILLIAMS. (1954). *Vet. Rec.* **66.** 215.
———. (1955). *J. Comp. Path.* **65.** 55.
WILSON, J. E. (1955). *Vet. Rec.* **67.** 849.
———. (1956). *Ibid.* **68.** 748.

PRESERVING MEAT BY ULTRA-VIOLET RAYS

Considerable interest has been expressed in the arrival of the first shipment of Australian beef brought to Britain by a new method under which ultra-violet rays are used to keep the meat fresh.

An experimental consignment of some 30 tons, apparently in prime condition, arrived after a 30-day voyage from Sydney which may—though the experts are cautious about this at present—do much to help Australia's attempt to increase her share of the British chilled-beef market, at present the preserve of Argentina.

Australia's great handicap in this trade can be measured simply in terms of nautical miles. South American beef, with no more than a 15-day voyage, arrives in Britain as fresh as it leaves Argentina. Chilled beef from Australia takes much longer and needs special treatment to prevent the growth of bacteria.

Hitherto this treatment has been administered in the form of carbon dioxide, an expensive operation involving special gas-tight chambers, with which few ships on the Australian run are equipped. With ultra-violet rays flooding the cargo locker from a battery of lamps, shippers hope to achieve the same result by simpler means.

Until this first " guinea-pig " consignment has been subjected to exhaustive tests judgment must be reserved. But the successful application of the system in Australian meat storage rooms for some months augurs well for the future of the Anglo-Australian meat trade.

A Simple Method for the Examination of Blood Samples by the Estimation of Specific Gravity

BY

B. L. EDWARDS

Gonville and Caius College, Cambridge

THE examination of an animal's blood can reveal very useful information, but many of the techniques available at present are too time-consuming for routine use in the practitioner's surgery. Attention may be drawn, however, to the value of the estimation of the specific gravity of whole blood or of plasma which may be done very simply, as described below. The specific gravity of whole blood (if the plasma proteins are within normal limits) varies with the red cell concentration, and thus gives a measure of the haemoglobin concentration, while the specific gravity of plasma depends largely on the plasma protein concentration. The assessment of the severity of anaemia or depression in the level of plasma proteins is of value in reaching a prognosis in some cases, for example in haemorrhage in all species or post-parturient haemoglobinuria of cattle. In small animals, where it is intended to use expensive plasma substitutes or blood transfusion, some accurate measure of the quantity required is of great value.

A simple technique to measure red cell and plasma protein status by the estimation of the specific gravity of whole blood and of plasma has been in existence since 1943, when it was first introduced in the U.S. Army and Navy Medical Services. It is widely used in routine examinations in connexion with blood transfusions. In a few minutes information can be obtained which would take nearly an hour using more conventional methods. Furthermore all the apparatus and reagents are simple, and can be constructed readily at negligible expense. The procedure has been fully described by Phillips *et al.* (1950).

The blood is collected in a ½-oz. bottle containing 0.2 ml. of dried Wintrobe Mixture which acts as an anticoagulant. Two g. of potassium oxalate, ⅓ g. of ammonium oxalate, and 1 ml. of formalin are made up to 100 ml. with distilled water.

At the surgery a drop is released at a height of 1 centimetre into a solution of copper sulphate made up to a specific gravity of 1.055. If it sinks to the bottom immediately another drop is tried on a solution of sp. gr. 1.060. If the drop rises then sp. gr. 1.050 should be tried and so on. If the drop comes to rest for 5 to 15 seconds before rising or falling ultimately, its specific gravity is identical with that of the solution of copper sulphate into which it has been dropped. A range of seven solutions from sp. gr. 1.035 to 1.065 will cover all the variations found in blood samples from animals in health and disease.

The range from 1.020 to 1.030 is used for finding the sp. gr. of samples of plasma, obtained when the blood samples are centrifuged. This is unnecessary where only a broad picture of haemodilution or haemoconcentration is required.

Solutions of intermediate specific gravity may be made up according to the degree of accuracy required.

In my experience, 100 ml. bottles, measuring 5 by 1¼ by 1¼ inches and of square cross-section, are ideal for the purpose, and are usually plentiful in most practices. The solutions are made up by diluting a stock solution of copper sulphate with a sp. gr. of 1.100. The latter is prepared by dissolving 170 grammes of copper sulphate in 1 litre of water.

The sp. gr. should be checked using a hydrometer, and more copper sulphate or water added as indicated. The local garage could check the sp. gr. if a hydrometer is not available in the surgery.

The dilutions of the stock solution may be made according to Table I.

TABLE I

DILUTIONS OF STOCK SOLUTION OF COPPER SULPHATE (SP. GR. 1·100)

Sp. gr. (whole blood)		Stock solution of copper sulphate	Water
1·035		17·0	33
1·040		19·5	30·5
1·045	Normal range	22·0	28·0
1·050		24·5	25·5
0·55		27·0	23·0
1·060		29·5	20·5
1·065		32·0	18·0
Sp. gr. (Plasma)			
1·030		14·5	35·5
1·025		12·0	38
1·020		9·5	40·5

Fifty ml. of diluted copper sulphate can be used for 50 tests before it needs replacement.

Pasteur pipettes are necessary for dropping the blood into the solutions, but can be prepared readily from glass tubing, after some practice, with the flame of a bunsen burner. They can be washed out, dried, and used again.

With regard to interpretation, the list of examples (Table II) will give an indication of the potentialities of the test. It was not my good fortune to be able to apply it in small animals. In such cases as pyometra in the bitch or severe haemorrhage or burns, such a test could provide a basis for the assessment of the dosage of various types of fluid in replacement therapy. At present, where calculations are attempted, they are based on values for haemoglobin or packed cell volume.

In the light of my own limited experience, I would suggest that where the sp. gr. of the whole blood of a bovine animal falls below 1.035, the prognosis is very grave. Where facilities are available to centrifuge blood samples, the sp. gr. of the plasma enables

TABLE II
EXAMPLES OF USE OF TEST IN CATTLE

Condition	Packed cell volume	(Normal $6{\cdot}0 \pm 1{\cdot}3 \times 10^6$) Total R.B.C. count	(Normal $11.8 \pm 1{\cdot}3$) Haemoglobin Grammes/100 ml.	Sp. gr. of Whole Blood
*(1) Ragwort Poisoning	31·5 per cent.	5·40	10·2	1·048
(2) Post-parturient haemoglobinaemia	13·0 „ „	1·75	4·9	1·041 (Haemoglobinaemia)
(3) Cystic Haematuria (died 2 days later)	17·0 „ „	3·27	6·09	1·035
(4) Traumatic Reticulitis (some dehydration)	53·0 „ „	5·51	13·89	1·060
(5) Johnes Disease	43·0 „ „	—	12·29	1·050
*(6) Abomasal ulceration with chronic melaena and anaemia	24·0 „ „	3·85	8·7	1·044
Time taken	½ hour	½ hour+	½ hour (Alkaline Haematin)	2 *Minutes*
	Conventional Haematology			

* (Numbers 1 and 6 were cases in the hospital of the Department of Veterinary Clinical Studies, Cambridge).

the practitioner to assess whether anaemia is due to excessive blood loss or to defective red-cell formation. In the latter case the sp. gr. of the plasma would be unchanged, whereas it would be lowered where plasma as well as blood is lost, and generalised haemodilution compensates for the fall in blood volume. In cases of loss of fluid from severe burns, protracted vomiting and diarrhoea, the sp. gr. of the blood may be as high as 1.070.

As is the case with other laboratory procedures, it is for the practitioner to assess the value of the test, in relation to the particular conditions under which he has to work. It has the advantage of being so simple as to lend itself to being carried out by lay staff.

Acknowledgments.—It is with great gratitude that I acknowledge the financial assistance granted to me by the Agricultural Research Council. My thanks are due also to Professor L. P. Pugh and Mr. E. T. Rees-Evans for their interest in this development, and to Miss Margaret Moore for technical advice and assistance. I am indebted to Messrs. A. J. MacLennan and A. Riggs of Inverness for facilities to assess the practical value of the technique, while seeing practice with them as a student.

Reference

PHILLIPS, R. A. *et al.* (1950). *J. Biol. Chem.* **183.** 305–30.

BANQUET OF THE FARRIERS' COMPANY

Leaders of the profession were among the distinguished guests who were present at a banquet in Guildhall, London, to celebrate the 600th anniversary of the Worshipful Company of Farriers. The guests of honour were the Lord Mayor and the Lady Mayoress, and the Duke and Duchess of Gloucester. Among those representing the profession were Mr. E. R. Callender, President of the B.V.A., and Mrs. Callender, Professor L. P. Pugh, President of the R.C.V.S., and Mrs. Pugh, Dr. W. R. Wooldridge, Mr. G. N. Gould, and Mr. C. T. Murphy who were present as Liverymen of the Company, with their wives, Mr. H. Sumner, Senior Vice-President of the R.C.V.S., Mr. R. E. Glover, Principal of the Royal Veterinary College, and Mrs. Glover, Mr. H. W. Dawes, Past-President of the R.C.V.S., and Mrs. Dawes, and Mr. W. G. R. Oates, Registrar of the R.C.V.S. with Mrs. Oates.

In the foreward to a brochure presented to each guest the following notes are interesting:—

In the records of the Corporation we find that in the 30th year of Edward III, the year 1356, the Mayor summoned before him all the farriers of the City because many offences and damage had been committed against the Commonalty of the City and the Realm by " people not wise therein " who kept forges in the City and intermeddled with works of farriery which they did not understand, with the resultant loss of many horses.

The Mayor ordered the choosing of two Wardens, the most " sufficient and best-knowing " men; these were then sworn and given full power to oversee and govern the trade and to espy into the default thereof. The Mayor also fixed cash penalties for bad workmanship, and on the fourth offence they were ordered to forswear the trade within the City for ever.

Thus the initiative in the formal establishment of the Farriers came from the Mayor, Henry Rycard, though it is known that the members of the trade had got together in some sort of Fraternity at an earlier date.

In 1356 the horse was in general use and almost the only means of haulage; those who looked after him were of great importance, they not only supplied him with shoes, they were also horse-doctors. This latter function lasted for hundreds of years, until it became vested in the veterinary profession and the farrier became entirely a shoeing smith.

It will be recalled that the late Professor J. B. Buxton, formerly Principal of the Royal Veterinary College, was Master of the Company in the year of his death, 1953-4.

In the course of his speech the present Master, the Duke of Devonshire, welcomed the presence of Mr. Henry Sumner, " a master of the veterinary art."

News and Comment

THE B.V.A. AUTUMN CONFERENCE

As referred to in a leading article last week, the Association held a two-day conference at Victoria Halls, Bloomsbury Square, on Thursday and Friday last week. The general title of the conference was Supplements and Additives in Animal Feeding-stuffs. There was a large attendance, the hall being almost full on both days. About half of those present were veterinary surgeons, and the remainder were invited guests, representing other sciences, official bodies and delegates from the feeding-stuffs trade.

Mr. E. R. Callender, President of the B.V.A., took the Chair, and was accompanied on the platform by Mr. S. L. Hignett, Chairman of the Technical Development Committee, and Mr. G. N. Gould, immediate past-chairman of that committee, who acted as Deputy Chairman of the conference.

In opening the conference the President said:—

"This Conference arose out of a discussion between members of the Technical Development Committee and veterinary surgeons connected with commercial organisations, when the question of supplements and additives in animal feeding-stuffs and problems relating thereto were fully discussed.

"The outcome of that discussion was a recommendation that efforts should be made to collect and collate information on these subjects. It was suggested that this might best be done by the holding of a conference open to members of the Association and those other interested people whom the Technical Development Committee might wish to invite. Further, it was felt that a report of the proceedings was of such importance as to merit publication.

"A sub-committee was formed under the chairmanship of Mr. Gould; and here I would pay tribute to the work of that sub-committee, for it is entirely due to their efforts that this conference is possible. A glance at the programme would suggest that they have done an excellent job.

"The importance of the role of additives and supplements in animal feeding-stuffs is well recognised by our Association, and papers have been published in its journal from time to time in this connexion. We now have an opportunity to discuss the whole subject in detail. It is hoped that the papers and the subsequent discussion during the next two days will considerably enhance our knowledge of this very important subject.

"In extending a very cordial welcome to you all, I would express particular pleasure at seeing such a considerable number of our friends from outside the profession. We are glad to have them with us. We hope they will take an active part in the proceedings."

The conference then followed the programme which has been published already in this journal. The whole proceedings were filled with interest and with a wealth of practical information, and were closely followed by everyone present. The openers of discussions performed their function with notable ability, and the discussions themselves were brisk and informative. Each author introduced his own paper, and closed the discussion upon it; and the cordiality with which all the papers were received attested their worth. The formidable task of summing up each day's proceedings was undertaken by two distinguished members of the profession, Mr. William C. Miller on the first day, and Dr. W. S. Gordon on the second. In spite of the tightly packed nature of the programme time keeping was closely adhered to under the President's most able chairmanship.

In all, two most valuable and interesting days. The full proceedings will be published as a special issue of THE VETERINARY RECORD early in February 1957.

PETROL RATIONING

We are advised by the Ministry of Agriculture that application by veterinary surgeons for a supplementary petrol ration should be made to the appropriate Regional Petroleum Officer as soon as possible after the applicant has drawn his basic ration book. The necessary forms P.R.1. can be obtained from any main post office or local taxation office. Envelopes containing applications for a supplementary allowance should be marked "Veterinary." A list of regional petroleum offices is published on page 852.

THE CENTRAL VETERINARY SOCIETY

A meeting of more than usual interest has been arranged to take place at the Royal Veterinary College, by kind permission of the Principal, on Thursday, December 6th, at 6 p.m. The subject will be "My Impressions of the Veterinary Profession Abroad," and the speakers will be Mr. R. E. Glover, Dr. A. W. Stableforth, Dr. E. L. Taylor, and Dr. W. R. Wooldridge. Their observations will cover Australia, New Zealand, the United States, the Soviet Union, and the Caribbean.

All members of the profession will be welcome.

PRESENTATIONS BY THE TECHNICAL DEVELOPMENT COMMITTEE

A pleasant ceremony was held in the Common Room of the Royal College of Veterinary Surgeons, when two of those present, who had been concerned with the organisation of the party, found to their surprise that they were the very reason for the party being given.

On the evening of Friday, November 23rd, immediately following the successful B.V.A. conference, present and past members of the Technical Development Committee held a sherry party at the Royal College, by kind permission of the President. During the course of the evening, the President of the B.V.A., Mr. Callender, presented a handsome set of four travelling cases to Miss Rosa Smith, as a tribute from the Committee for her devoted service to their work, and on the occasion of her leaving to marry Mr. James A. Brown of Invergordon.

As most readers know, Miss Smith has spent the past 16 years in the Association's service, in the capacity of assistant to the General Secretary. She

has also been secretary to the Technical Development Committee from its inception. Miss Smith is known to a host of veterinary surgeons, and her happy personality, efficiency, and great loyalty to the B.V.A. have raised her to high esteem. Her presence at Headquarters, and at various conferences, notably the Annual Congress, will be very much missed, and no one could carry away with her into married life a greater volume of good wishes.

Miss Smith thanked the present company, and also those who had not been able to come, for this unexpected, charming gesture. She said that she had been completely taken by surprise, as she was under the impression that the party was being organised for a presentation to someone else.

There then followed a further presentation in the form of a handsome statuette of a cow in solid silver to Mr. G. N. Gould, as a tribute to the great work he had performed during his chairmanship of the Committee. Mr. Gould, in expressing his thanks, observed that he was just as mystified as Miss Smith, as he had helped to organise the party under the belief that it was for a presentation to her. In the course of the evening Dr. Montgomerie paid a very warm tribute to Miss Brancker, a vice-chairman of the Committee who, though unable to be with them that evening, had played a conspicuous part in organising these ceremonies.

COLONIAL OFFICE APPOINTMENTS

The following appointments are announced:—

September

Promotions.—C. J. Wiley, Laboratory Technologist, Veterinary Department, Kenya, to be Zoologist (Entomology) Kenya. F.Wilson, Field Officer, E.A.T.R.O., Uganda, to be Field Officer, Veterinary Department, Uganda.

New appointments.—W. Bruce, B.SC., Veterinary Research Officer, Kenya; G. D. Paine, Veterinary Officer, British Guiana; P. H. S. White, Veterinary Officer, Northern Rhodesia.

October

Promotions.—A. Ginsberg, Veterinary Officer, Kenya, to be Senior Veterinary Officer, Research Officer (Hygiene), Kenya; L. S. Pfob, Veterinary Officer, Uganda, to be Senior Veterinary Officer, Uganda; P. T. Preston, Veterinary Officer, Kenya, to be Provisional Veterinary Officer, Kenya; E. A. Wells, Veterinary Officer, Uganda, to be Senior Veterinary Officer, Uganda.

New appointments.—B. Heyworth, Veterinary Officer, British Guiana; D. McManus, Veterinary Officer, Kenya; D. D. O. Pawson, Veterinary Officer, Tanganyika; J. H. Robb, Veterinary Officer, Western Region, Nigeria; L. F. Slater, Veterinary Officer, Uganda.

November

Promotions.—J. F. Hart, O.B.E., Provincial Veterinary Officer, Kenya, now assistant Director (Field) Services, Kenya; R. W. E. Lewis, Provincial Veterinary Officer, Kenya, now Assistant Director (Field) Services, Kenya; E. G. Mcanulty, Laboratory Technician, Uganda, now Chief Laboratory Technologist, Uganda; G. R. Scott, M.SC., B.SC., Veterinary Research Officer, Kenya, now Senior Virologist, East African Veterinary Research Organisation, Kenya.

New appointments.—K. L. Strickland, Veterinary Investigation Officer, Northern Nigeria; J. B. Dundas-Taylor, Veterinary Research Officer, Nyasaland.

VETERINARIANS' LECTURE TO PIG-BREEDERS

A system of intensive pig production which is practised on a large scale in Northern Ireland was outlined to a large gathering of Lincolnshire pig-breeders recently at a meeting jointly organised by Lindsey Agricultural Executive Committee and the Lincolnshire Farmers' Union at Market Rasen. The speakers were Professor H. G. Lamont and Dr. D. Luke. Professor Lamont and Dr. Luke visited Market Rasen at the special request of Lincolnshire farmers when they were on their way to attend the recent autumn conference of the B.V.A.

Professor Lamont showed a film on pig diseases illustrating the lines on which current research is now proceeding in Northern Ireland. On the preventive side, he stressed the need for the fullest attention to be given to environment and details of husbandry rather than being content with traditional methods of housing pigs and giving primary consideration to feeding.

This theme was continued by Dr. Luke, who gave an outline of experiments and current practice at Clough Mills, reputed to-day to be the biggest single producing unit in Europe.

Dr. Luke, describing the system followed at this centre, showed charts and graphs which indicated that best results to date have been obtained by restricting ventilation, pushing up the temperature of the pig houses to 85°, and eliminating draughts in every possible way.

"At the moment," said Dr. Luke, "we are not unreservedly recommending that our methods should be followed. The logical outcome of them is to some extent a matter of investigation. We realise that we are going against accepted practice and that a certain amount of caution is necessary before the adoption of these methods on a wide scale.

A paper on this subject by Dr. Luke and Mr. W. A. M. Gordon will be published in THE VETERINARY RECORD fairly shortly.

IN PARLIAMENT

Foot-and-Mouth Disease (Argentine Meat)

MR. HURD (November 22nd) asked the Minister of Agriculture, Fisheries and Food what steps his veterinary officers stationed in the Argentine take to reduce to a minimum the risks of carcase meat infected with the virus of foot-and-mouth disease being sent to this country.

THE MINISTER OF AGRICULTURE, FISHERIES AND FOOD (MR. HEATHCOAT AMORY): My two veterinary officers at Buenos Aires maintain close contact with the veterinary authorities in South America and regularly visit slaughterhouses, processing plants, cold stores, and other premises used in connexion with

the export of meat to this country. They supervise the inspection of as many of the carcases as possible for any evidence of foot-and-mouth disease virus. In addition, the live animals are inspected at the unloading points at the railheads. No part of a carcase is shipped from South America to this country if any evidence of disease is found in any part of it, nor are any animals from an infected consignment slaughtered for export to Great Britain.

MR. HURD: Will my right hon. Friend keep the closest watch to make sure that the inspection is more effective, as most of the initial outbreaks we have suffered in this country during the past few months have been traced by his Department to infection through imported meat?

MR. AMORY: Yes, I am aware that the infection has been traced to imported meat. I can assure my hon. Friend that if I could see any step which I could usefully take to strengthen and make still more effective my present inspection arrangements in South America, I should not hesitate to take it.

MR. T. WILLIAMS: May I ask the right hon. Gentleman whether we are still sending vaccine to South America?

MR. AMORY: Without notice, I could not say as regards South America; but we export vaccine quite widely.

MR. E. L. MALLALIEU: Can the Minister say whether there is any reason why meat should not be imported from France on the same terms as from Argentina, as regards foot-and-mouth disease?

MR. AMORY: Our animal health regulations are the only prohibition on the import of meat from there; we have to take each country on its merits and on its record. I hope that the hon. and learned Member for Brigg (Mr. E. L. Mallalieu) will agree with me that we are right to adopt a very strict standard in this very important matter.

Cattle Exports, Richborough

MR. BOTTOMLEY (November 22nd) asked the Minister of Agriculture, Fisheries and Food if he will make a statement about the export of cattle from the port of Richborough, Kent.

MR. AMORY: Substantial numbers of cattle have been exported this year from Richborough to the Continent for slaughter. The transit of cattle to the port and on the voyage is governed by comprehensive regulations designed to prevent unnecessary suffering, and the attention of shipping companies regularly engaged in this traffic has been drawn to them. Officers of my Department recently investigated conditions at the port and examined several hundred cattle there. Adequate food and water were available and there was no evidence of cruelty or suffering while the animals were awaiting shipment.

MR. BOTTOMLEY: I thank the Minister for that reply, but may I ask whether he is aware that there is still public disquiet in the district, and that it is alleged that these cattle are being exported under conditions which amount to cruelty? Further, may I ask why we export these cattle, subsidised, at cheaper prices than we have to pay for imported meat from the Argentine?

MR. AMORY: To answer the first part of the right hon. Gentleman's supplementary question, I will note what he says, and I give him the assurance that I will keep a very close eye on this situation at Richborough. As regards the second part of his question, I am satisfied that these exports are in the economic interest of this country. I think it will help the right hon. Gentleman to understand how that could be when I say that I think two-thirds of the exports of cattle represent the export of cows and not young heifers; and of the remainder, a proportion is sold for dollars for the use of American troops on the Continent.

MR. T. WILLIAMS: Might I ask whether any of those cattle which have been exported—with which I do not disagree, though I would prefer to see carcases exported rather than live-stock—have been followed to the various slaughterhouses to ascertain what kind of treatment they get?

MR. AMORY: I should think not, but I will look into that point.

SIR A. GOMME-DUNCAN: Would my right hon. Friend agree that the bulk of this export of cattle is of pedigree cattle and of great value to stocks of cattle in this country also?

MR. AMORY: As far as the export of pedigree cattle is concerned, that would be so; but in this instance I think the Question is dealing with cattle which are exported to the Continent for slaughter there.

Animal Health (Advisory Council)

MR. PHILIPS PRICE (November 21st) asked the Secretary of State for the Colonies why his Advisory Council for Agriculture, Animal Health, and Forestry now only contains two members representing animal health as against four when it was constituted in 1929; and whether, in view of the importance of live-stock in the rural economy of under-developed Colonial Territories, he will reconsider this matter at an early date.

MR. LENNOX-BOYD: The Advisory Council for Agriculture, Animal Health, and Forestry was recently reorganised and reduced in numbers to act as a small group of experienced men to advise on broad issues of policy. The Council will turn to individual specialists for detailed advice as necessary on particular problems, including animal health questions and in these circumstances, while fully accepting the hon. Member's views on the importance of live-stock in the rural economy of the Colonies, I do not consider that the Council's composition requires re-examination.

UNIVERSITY NEWS

Cambridge

The University of Cambridge recently accepted an offer by the British Oil & Cake Mills, Ltd., of £2,700 for the provision of a Senior Studentship in the School of Veterinary Medicine in the subject "Poultry Metabolism." The first holder of the post is Mr. Mark Fussell, B.A., VET.M.B. (CANTAB.), M.R.C.V.S., who is carrying out research under the direction of Professor L. P. Pugh, Director of Clinical Studies in the School.

MR. G. P. MALE, O.B.E.

As we go to press we learn with deep regret of the death of Mr. G. P. Male, O.B.E., a past President of the Association and of the Royal College of Veterinary Surgeons. He died peacefully last Thursday after a long illness. The funeral will take place on Tuesday at St. Peter's Church, Earley, Reading, at 2.15 p.m.

SIR LIONEL WHITBY

The death of Sir Lionel Whitby, C.V.O., M.C., M.D., F.R.C.P., D.P.H., Regius Professor of Physic at Cambridge and Master of Downing College, took place last Saturday. Sir Lionel was the University's representative on the Council of the Royal College of Veterinary Surgeons. He was a regular attender of meetings, and a welcome figure at the annual banquet. He always took a close interest in the Royal College's work, and his wisdom, learning, and courtesy were all most highly esteemed by his colleagues.

Sir Lionel Whitby was a noted bacteriologist and haematologist, and among many other things rendered distinguished service during the Second World War as consulting surgeon to the Army in blood transfusion and resuscitation. He was also one of the first scientists in Britain to make experimental studies of the sulphonamides, and played a leading part in the introduction of sulphapyridine in the treatment of pneumonia.

He will be remembered as one of the team of physicians who attended King George V; and he was also consulted by Sir Winston Churchill in his illnesses in 1943 and 1944.

PERSONAL

Birth

EARNSHAW.—On November 17th, 1956, to June, wife of R. E. Earnshaw, M.R.C.V.S., of Penticton, British Columbia, Canada, a son, Richard Spencer.

Death

SPENCE.—At a Nuneaton hospital on November 15th, 1956, Rosemary Leslie McEwan, wife of Norman Spence, M.R.C.V.S., "Dunvegan," Harpers Lane, Atherstone, Warwickshire, and mother of Stuart and Fiona.

COMING EVENTS

December

4th (Tues.). Special Meeting of the Technical Development Committee, B.V.A., at 7, Mansfield Street, London, W.1, 10.30 a.m., to discuss bovine mastitis.

5th (Wed.). Meeting of the Ayrshire Division in the Veterinary Investigation Dept., West of Scotland Agricultural College, Auchincruive, 7.30 p.m.

6th (Thurs.). General Meeting of the Central Division, B.V.A., at the Royal Veterinary College, Camden Town, N.W.1, 6 p.m.

General Meeting of the Western Counties Division, B.V.A., at the Rougemont Hotel, Exeter, 2.30 p.m.

7th (Fri.). Second Meeting of the British Veterinary Poultry Association in the main conference room at Olympia, London, 3 p.m.

12th (Wed.). General Meeting of the Midland Counties Division at the Birmingham Medical Institute, 154, Great Charles Street, Birmingham, 2.30 p.m.

Ordinary General Meeting of the Sussex Veterinary Society at the Adelphi Hotel, Brighton, 2.30 p.m.

14th (Fri.). Annual Dinner Dance of the North Wales Division at the St. George's Hotel, Llandudno.

Ordinary General Meeting of the South Wales Division at Cardiff.

19th (Wed.). Meeting of the Section of Comparative Medicine, Royal Society of Medicine, at the Society's House, 5 p.m.

20th (Thurs.). Annual Dance of the V.V.B.F. Ladies' Guild, Dumfries Division, in the Cairndale Hotel, Dumfries.

January

24th (Thurs.). Annual Dinner and Dance of the V.V.B.F. (Northern Division) in the Northern Hotel, Aberdeen, 7.30 p.m.

23rd, 24th and 25th (Wed., Thurs. and Fri.). Quarterly Meeting of the Council of the British Veterinary Association in London.

FOOT-AND-MOUTH DISEASE

The area described in the schedule below is declared to be an Infected Area for the purpose of preventing the spread of foot-and-mouth disease:—

An area comprising:—

The City and County Borough of Worcester.

IN THE COUNTY OF HEREFORD

In the Petty Sessional Division of Bromyard: The parishes of Upper Sapey, Wolferlow, Collington, Tedstone Wafer, Tedstone Delamere, Edvin Loach, Edwyn Ralph, Saltmarshe, Norton, Brockhampton, Whitbourne, Linton, Stanford Bishop and Acton Beauchamp so much of the parish of Thornbury as lies to the east of the road running from Bockleton via The Birches and Thornbury to Edwyn Ralph including the said road and so much of the parish of Cradley as lies to the north of the main road (A.4103) running from Leigh Sinton to Fromes Hill including the said road.

IN THE COUNTY OF SALOP

In the Petty Sessional Division of Bridgnorth: The parish of Neen Sollars.

IN THE COUNTY OF WORCESTER

The Boroughs of Bewdley, Droitwich and Kidderminster.

The Petty Sessional Divisions of Bewdley Borough, Hundred House and Stourport.

In the Petty Sessional Division of Tenbury: The parishes of Bayton, Mamble, Lindridge, Knighton on Teme, Rochford, Eastham, Hanley, Kyre and Stoke Bliss.

In the Petty Sessional Division of Kidderminster: The parishes of Kidderminster Foreign and Rushock and so much of the parishes of Stone and Chaddesley Corbett as lies to the south of the main road (A.448) running from Kidderminster to Bromsgrove including the said road.

In the Petty Sessional Division of Bromsgrove: The parish of Upton Warren.

In the Petty Sessional Division of Droitwich: The parishes of Elmley Lovett, Elmbridge, Doverdale, Hampton Lovett, Westwood, Hadzor, Salwarpe and Oddingley and so much of the parish of Dodderhill as lies to the west of the railway line running from Bromsgrove Station to Wadborough Station excluding the said railway.

In the Petty Sessional Division of Worcester: The parishes of Ombersley, Holt, Grimley, Martin Hussingtree, Wichenford, Kenswick, Hallow, North Claines, Hindlip, Doddenham Knightwick, Lulsley, Broadwas, Broadheath, Warndon, Tibberton, Cotheridge, St. John in Bedwardine County, Bredicot, Spetchley, Suckley, Alfrick, Leigh, Bransford, Powick, St. Peter the Great County, Whittington, Norton juxta Kempsey and Kempsey.

In the Petty Sessional Division of Malvern: The parishes of Malvern Link and Newland.

The area described in the schedule below shall cease to be an Infected Area for the purpose of preventing the spread of foot-and-mouth disease on December 3rd, 1956:—

An area comprising:—

The County Borough of Newport.

IN THE COUNTY OF GLAMORGAN

In the Petty Sessional Division of Caerphilly Lower: The parishes of Rhyd-y-gwern, Rudry and Llanfedw.

IN THE COUNTY OF MONMOUTH

In the Petty Sessional Division of Caerleon: The parishes of Llanfrechfa Upper, Llanfrechfa Lower, Llanvihangel Llantarnam and Caerleon.

In the Petty Sessional Division of Newport: The parishes of Henllys, Risca, Machen Upper, Machen Lower, Bettws, Rogerstone, Graig, Michaelstone-y-Vedw, Marshfield, Coedkernew, Duffryn, Peterstone Wentlloog and St. Bride's Wentlloog.

In the Petty Sessional Division of Bedwellty: So much of the parishes of Abercarn and Mynyddislwyn as lies to the south of the main road (A.472) running from Pontypool to Maes-y-cwmmer excluding the said road.

The area described in the schedule below shall cease to be an Infected Area on December 5th, 1956:—

IN THE COUNTY OF PEMBROKE

In the Petty Sessional Division of Dewsland: The parishes of St. David's, the Cathedral Close of St. David's, Whitchurch, St. Elvis, Llanhowell, Llanrhian, Llandeloy and Brawdy.

ADDRESSES OF DISEASE INFECTED PREMISES

The list given below indicates, first the county in which are situated the premises on which disease has been confirmed, followed by the postal address and date of outbreak.

Anthrax

Berks. Court House Farm, Great Coxwell, Faringdon (Nov. 20).

Ches. Hurst Farm, Appleton (Nov. 19).

Dumfries. Coshogle Farm, Enterkinfoot, Thornhill (Nov. 17).

Hants. Lower Farm, East Meon, Petersfield (Nov. 19); New Barn Farm, Ropley Alresford; Weston Farm, Micheldever, Winchester (Nov. 20).

Lanark. Birkwood Mains Farm, Lesmahagow (Nov. 19).

Leics. Hall Farm, Donisthorpe (Nov. 22).

Northants. Wells Coppice, Biggin Fields, Benefield, Oundle, Peterborough (Nov. 17).

Surrey. Loseley Dairy Farm, Loseley Park, Guildford (Nov. 19).

Sussex. Home Farm, Buchan Hill, Crawley (Nov. 22).

Yorks. Poplar Farm, Thorpe-in-Balne, Doncaster (Nov. 16).

Fowl Pest

Bedford. The Bakery, High Street, Eaton Bray, Dunstable (Nov. 19); 14, High Street, Eaton Bray, Dunstable (Nov. 20).

Bucks. 5, Church Lane, Mursley, Bletchley (Nov. 17).

Ches. 1, New Cottages, Hoo Green, Mere, Knutsford (Nov. 22).

Essex. 53 Straight Road, Boxted, Colchester (Nov. 20); Berseda, Arterial Road, North Benfleet, Wickford (Nov. 22); Woodside Farm, Boxted, Colchester (Nov. 23).

Kent. Hadmans Place Farm, Smarden, Ashford (Nov. 22).

Lancs. Beesleys Farm, Catforth; Balderstone Farm, Bartle Lane, Woodplumpton; Carr Lane, Pilling; Carr Lodge, Carr Lane, Pilling; Abrahams Farm, Pilling; Priorcroft, Leyland Lane, Ulnes Walton; Bellford Poultry Farm, Woodplumpton; Aldersyde, Woodplumpton, Preston (Nov. 16); Eastview, Woodplumpton; 93, Southport Road, Scarisbrick, Ormskirk; Moorside Farm, Woodplumpton, Preston (Nov. 17); Bell Fold Farm, Woodplumpton; Sundial Farm, Woodplumpton; Anchorsholme Piggeries, Thornton, Blackpool; Longfields Farm, Cowhill, Grimsargh; Whitecross Farm, Woodplumpton, Preston (Nov. 18); Tithe Barn Farm, Hutton; Brick Kiln Farm, Skip Lane, Hutton; Bridge Farm, Southport Old Road, Mere Brow, Tarleton; Tadley House Farm, Higher Bartle, Preston (Nov. 19); Eastview, Brownhill Lane, Longton; Heatherdene, Rosemary Lane, Bartle; Bridge Farm, Woodplumpton; Kemmel Dene, Townley Lane, Penwortham; Sunnybank, Hambleton, Blackpool; Houghton Farm, Osbaldeston, Blackburn (Nov. 20); Rosewood Farm, Liverpool Road, Hutton; Stanleyfield, Long Mors Lane, New Longton; Old Woodfold Farm, Woodplumpton; Runshaw Hall, Euxton, Chorley; Hornbys Farm, Forton; Wayside Cottage, Durton Lane, Haighton Grimsargh (Nov. 21); Edge Farm, Woodplumpton; Archer Farm, Woodplumpton; Whittle Hill Farm, Woodplumpton; 89, Southport Road, Scarisbrick, Ormskirk; Barnfield, Liverpool Road, Hutton; Mayfield, Liverpool Road, Hutton; Greenlands, Whittle Hill, Woodplumpton (Nov. 22); Glenhaven, Whittle Hill, Woodplumpton; Harrisons Farm, Chapel Lane, Longton; Clarksons Fold Farm, Cowhill, Grimsargh; 34, Pool Hey Lane, Scarisbrick; Langdale, The Lane, Ingol (Nov. 23); Ansville, Station Road, Midge Hall; Lower Park Head, Woodplumpton; Fell View, Woodplumpton; Green Farm, Osbaldeston; Frankland Farm, Liverpool Road, Longton; Willow Brow Poultry Farm, Moss Lane, New Longton; Woodlands Poultry Farm, Dunkirk Lane, Leyland; Rush Paddock Farm, Osbaldeston; Whinney Fields Farm, Woodplumpton (Nov. 25).

Swine Fever

Berks. Wickham House, Wickham, Newbury (Nov. 23).

Essex. Red Lyons Farm, Latchingdon, Chelmsford (Nov. 22).

Monmouth. Old Slaughter House, Victoria Road, Ebbw Vale (Nov. 23).

Norfolk. Avenue Farm, Hevingham, Norwich (Nov. 20).

Northumberland. Blue House Bridge, Coast Road, North Shields (Nov. 23).

Oxford. Kidmore End Farm, Kidmore End (Nov. 20); Judges, Wardington, Banbury (Nov. 22).

Rutland. Balke Hill, Bisbrooke (Nov. 22).

Somerset. Willow Farm, Shepton Beauchamp, Ilmister (Nov. 20).

Yorks. Piggeries, Thorn Road, Hedon, Hull (Nov. 22); Broadley House, Ryhill, Thorngumbald; 63, Field Lane, Wakefield (Nov. 23).

CORRESPONDENCE

The views expressed in letters addressed to the Editor represent the personal opinions of the writer only and their publication does not imply endorsement by the B.V.A.

Suspected Poisoning by Wild White Clover

Sir,—I read with interest the brief communication from Mr. Hobson in your issue of November 24th, and I should like to describe a case of suspected over-indulgence in clover, which resulted in hypocalcaemia. The subject was a third calver Friesian cow, calved three months and served two weeks, which was grazed on a permanent pasture consisting almost entirely of a low "matt" of small-leaf clover. The cow had shown profuse diarrhoea for 24 hours, before she was noticed to be unsteady at the morning milking, when her milk yield was low.

The cow was examined in the late afternoon, soon after she had become recumbent. She was found to be almost comatose, with the muzzle turned to the flank. The heart rate was 76 per minute, the temperature 98.6°, the muzzle dry, and the pupils of the eyes dilated and insensitive to light. A blood sample was taken which, when examined by the Veterinary Laboratory, Weybridge, revealed levels of calcium 5.0 and magnesium 2.9 mg. p.c. serum, and inorganic phosphorus 4.7 mg. p.c. blood.

Treatment consisted of a solution of calcium borogluconate and magnesium hypophosphite administered intravenously. The cow rose some four hours later, but her milk yield was negligible until posterior pituitrin had been injected intramuscularly on the third day.

Mr. Hobson describes symptoms of staggering, scouring profusely, and blindness. I wonder if any of his cases suggested mild hypocalcaemia. In this connexion I feel it is worth remarking on the similarity between toxaemia and hypocalcaemia when an animal shows diarrhoea, unsteady gait, and a low temperature.

Yours faithfully,

LIONEL A. HEMSLEY.

c/o 312, Lower Addiscombe Road,
Croydon,
Surrey.

November 26th, 1956.

The Use of Dehorning Collodion in Calves

Sir,—I would refer to the letter from Mr. Jones-Davies on the use of dehorning collodion (*Vet. Rec.* **68.** 794).

From the description given it would appear in the first case, where there was an interval of only 15 days or so between the two occasions on which the material was used, that the symptoms arose from mis-application of the caustic collodion over too wide an area causing burning of the sensitive tissues. The area to be treated for each bud should not exceed the area of a sixpence.

In the other case, where a few months elapsed between the first and second use of the same bottle, it looks as if there had been some concentration of the caustic material due to evaporation of the volatile collodion base, most probably as a result of the cap of the bottle not being firmly replaced.

As the original manufacturers in this country of this method of applying caustic to horn buds, we have been aware of the evaporation problem, and much development work has gone into the design of the best possible form of presentation. Ideally, the material should be marketed in very small bottles so that it will be likely to be used up quickly. It has proved exceedingly difficult to evolve a suitable form of closure. Glass stoppers, if replaced loosely, are apt to "lift" (thereby releasing more of the volatile material) if kept in a warm atmosphere or exposed to sunlight; if put in tightly it may be impossible to remove the stopper at a later date. Cork, rubber, metal, and some plastic materials are all attacked and destroyed by the caustic agent. Polyethylene is, however, resistant, and is used as a wad in a plastic cap.

Work is still going on to try to overcome this problem, because the product has been well received and sufficient has been supplied in the last few years to have dehorned more than 1,000,000 calves. The product is successful when used as directed, and more important still, it provides a safeguard against destruction of the eye due to moisture from the bud running down the side of the face, as is likely with caustics not compounded in a collodion base.

Very careful instructions are given so as to try to avoid the possibility of faulty application, and as we have explained, every effort is being made to remove the remaining difficulty.

Mr. D. V. Sinclair, in his letter (*Vet. Rec.* **68.** 814), mentions that the manufacturer of the collodion in one of his cases arranged for a *post-mortem* examination to be carried out. I could wish he had explained that the work was carried out in the Pathology Department of a veterinary school, and under the most searching examination no abnormality was detected; and it does seem difficult to accept that a chemical caustic of the nature used would be likely to penetrate the thickness of the skull.

Yours faithfully,

N. M. BLACK,
Veterinary Adviser.

Boots Pure Drug Co. Ltd.,
Station Street,
Nottingham.

November 20th, 1956.

Oedema Disease of Swine

Sir,—At the N.V.M.A. (now B.V.A.) Congress held in Cardiff in 1950, the author stated that the clinical and experimental evidence then available concerning oedema disease strongly suggested that it was a specific toxaemia either originating in the bowel or due to the ingestion of a preformed toxin. During the subsequent years, when pressure of other duties permitted and opportunities for obtaining material from outbreaks of the disease were near at hand, further experimental work was undertaken from time to time, mainly with the object of submitting the

above hypothesis to experimental test. Since, however, it is intended to publish in detail, this and other experimental work relating to the condition at an early date, the purpose of this communication is to record a brief summary of some of the experimental findings considered by the author to be of most value to interested research workers and to veterinary surgeons who encounter the disease in the course of practice.

Experimental Results

(1) Potent centrifuged supernatant fluid obtained from the small intestinal contents of naturally occurring cases of the disease, whether undiluted or diluted as a result of saline extraction of the contents, retained its capacity to produce the disease after being stored for 11 months at a temperature of approximately 20° F. At this temperature small quantities of fluid varying from 10 to 40 ml. are generally frozen hard within four to five hours.

(2) In a few preliminary experiments to determine if the oedema disease-producing factor in bowel supernatant fluid is resistant to heat, pigs were inoculated intravenously with supernatant fluid heated for 15 minutes in a boiling-water bath and, in a subsequent experiment at temperatures of approximately 70°, 65°, and 60° C. for the same period. The only pig to develop oedema disease as a result of which it died, was that which received supernatant heated at 60° C. Control animals in each experiment developed fatal oedema disease.

(3) Experiments planned to test that part of the hypothesis relating to the ingestion of a preformed toxin failed to demonstrate the oedema disease-producing factor in the gastric contents of 18 naturally occurring cases of the disease, whereas it was demonstrated in the small intestinal contents of 12 carcases from the same series of cases. The gastric and intestinal preparations were tested by the intravenous method of inoculation in pigs.

TABLE I

SERUM PROTECTION EXPERIMENTS WITH PIG SERA A AND B

Principals					Controls			
Expt. No.	Pig	Bowel Supernatant	+ Serum A	Result	Pig.	Bowel Supernatant	+ Normal Serum	Result
1	592	10 ml.	+ 10 ml. A	Survived	589	10 ml.	—	O.D. Died
1	593	10 ml.	+ 10 ml. A	Survived	590	10 ml.	—	O.D. Destroyed
1	594	10 ml.	+ 10 ml. A	Survived	591	10 ml.	—	O.D. Died
1	595	10 ml.	+ 10 ml. A	Survived				
2	608	12 ml.	+ 12 ml. A	Survived	603	12 ml.	—	O.D. Died
2	609	12 ml.	+ 12 ml. A	Survived	604	12 ml.	—	O.D. Recovered
3	614	20 ml.	+ 20 ml. A	Survived	612	20 ml.	—	Survived
3	616	20 ml.	+ 20 ml. A	Survived	613	20 ml.	—	O.D. Died
4	625	23 ml.	+ 23 ml. A	Survived	624	23 ml.	—	O.D. Died
			+ Serum B					
5	680	15 ml.	+ 15 ml. B	Survived	679	15 ml.	—	O.D. Died
5	682	15 ml.	+ 15 ml. B	Survived	681	15 ml.	—	O.D. Died
5	684	15 ml.	+ 15 ml. B	Survived	683	15 ml.	—	O.D. Died
5	686	15 ml.	+ 15 ml. B	Survived	685	15 ml.	—	O.D. ? Died
6	689	20 ml.	+ 20 ml. B	Survived	688	20 ml.	—	O.D. Destroyed
7	691	20 ml.	+ 20 ml. B	Survived	690	20 ml.	—	O.D. Destroyed
7	693	20 ml.	+ 20 ml. B	Survived	692	20 ml.	—	O.D. Died
8	697	15 ml.	+ 15 ml. B	Died within 3 hours	696	15 ml.	+ 15 ml.	O.D. Destroyed
8	699	15 ml.	+ 15 ml. B	Survived	698	15 ml.	+ 15 ml.	O.D. Died
9	701	10 ml.	+ 10 ml. B	Survived	700	10 ml.	+ 10 ml.	O.D. Died
9	703	10 ml.	+ 10 ml. B	Survived	702	10 ml.	+ 10 ml.	O.D. Died
9	705	10 ml.	+ 10 ml. B	Survived	704	10 ml.	+ 10 ml.	O.D. Died
10	751	20 ml.	+ 10 ml. B	Survived	754	20 ml.	+ 10 ml.	O.D. Destroyed
10	752	20 ml.	+ 10 ml. B	Survived	756	20 ml.	+ 10 ml.	O.D. Died
10	753	20 ml.	+ 10 ml. B	Survived	757	20 ml.	+ 10 ml.	O.D. Died
10	755	20 ml.	+ 10 ml. B	Survived	758	20 ml.	+ 10 ml.	O.D. Died

PRINCIPALS.—Of 25 pigs in this group 24 survived the inoculation and showed no symptoms of oedema disease.
One pig died within three hours after inoculation from an acute toxic condition of unknown cause.

CONTROLS.—Of 24 pigs in this group 22 died (five were destroyed when *in extremis*), 21 of which were affected with oedema disease. The remaining pig (685) died six hours after inoculation and, although no gastric or mesenteric (colon) oedema was present, death may have been due to acute oedema disease, since there was well marked oedema of the wall of the gall bladder and an area of oedema around the portal-gastric lymph node and along the serous aspect of the lesser curvature of the stomach.
Of the two surviving pigs (604 and 612) one survived the inoculation with no evidence of oedema disease and the other developed a mild form of the disease from which it recovered.

NORMAL SERUM = Serum obtained from pig about 12 st., wt., slaughtered at abattoir.

TABLE II

PROTECTION EXPERIMENTS WITH PIG SERUM 739

Principals					Controls			
Expt. No.	Pig	Bowel Supernatant	+ Serum 739	Result	Pig	Bowel Supernatant	+ Normal Serum	Result
1	766	20 ml.	+ 10 ml.	Survived	765	20 ml.	+ 10 ml.	O.D. Destroyed
2	773	25 ml.	+ 10 ml.	Survived	774	25 ml.	+ 10 ml.	O.D. Died
3	775	25 ml.	+ 10 ml.	Survived	776	25 ml.	+ 10 ml.	O.D. Died
4	777	24 ml.	+ 10 ml.	Survived	778	24 ml.	+ 10 ml.	O.D. Died

None of the principals showed any evidence of oedema disease. In the control group three pigs died of oedema disease and one was destroyed when in an advanced stage of the disease.

(4) Experiments to determine if the oedema disease-producing factor in bowel contents of affected carcases was antigenic were made with the sera of two pigs (A and B). These had received a series of intraperitoneal and intramuscular inoculations of alum precipitated material derived from formalinised supernatant fluid together with a limited number of intravenous inoculations of untreated supernatant fluid. The experiments consisted in ascertaining if the respective sera A and B had any protective effect when mixed with supernatant fluid and the mixture inoculated intravenously into pigs. Control pigs were provided for each experiment and received either supernatant fluid only or supernatant mixed with normal pig serum. The majority of pigs used in the experiments were litter mates. For purposes of convenience the experiments are shown in tabular form.

(5) In an indirect approach to ascertain the aetiological significance, if any, of bacterial isolations from small intestinal contents of affected cases of oedema disease, a pilot trial was made to determine the protective value of the serum of a pig (739) immunised with a haemolytic gram-negative micro-organism—subsequently shown to be of coliform type. The organism selected for immunisation was chosen mainly for the reason that it was agglutinated to a high titre by serum from pig B (see preceding experiment). Immunisation was effected by intraperitoneal and intramuscular inoculations of lightly centrifuged deposits obtained from cultures of the organism grown in Hartley's digest broth and liver infusion broth which were subsequently formalinised and treated with aluminium potassium sulphate. A final inoculation consisting of a heavy saline suspension of the living organism was given intravenously, the resulting systemic reaction being controlled with streptomycin. The protective value of the serum was tested by the intravenous inoculation of a mixture of serum and supernatant fluid into pigs. Control pigs received supernatant fluid and normal pig serum. Each experiment was made with litter mates. The experiments were carried out on four different occasions.

Yours faithfully,

J. F. TIMONEY.

Veterinary Research Laboratory,
Thorndale,
Beaumont Road,
Dublin.

November 8th, 1956.

Content of "The Veterinary Record"

Sir,—May we add our support to Messrs. Nye, Wilkins *et al.* regarding the content of THE VETERINARY RECORD?

As final year students, we find THE VETERINARY RECORD far too technical. It has offered very little in the way of practical help, during our studies, whereas the American veterinary publications offer a wide field of practical and theoretical knowledge. The main function of THE VETERINARY RECORD, at the moment, seems to be as a reference work for research workers.

In Sir William Slater's excellent speech at the beginning of our new session, he stressed the value of research work, a point which we heartily endorse. However, we do suggest, Sir, that the work of the practising veterinary surgeon is still as important as ever and that more practical articles would be of value.

Mr. Nye states that his article on spontaneous fracture of the patella in the greyhound was turned down because it was a common condition. Yet, Sir, in THE VETERINARY RECORD of November 10th, 1956, you were able to include an article on "Character in Cows," an excellent article, which no doubt would be of value to a veterinary surgeon who had never been on a farm.

Yours faithfully,

J. T. BLACKBURN,
A. G. SOUTHERTON, N.D.A.

Royal Veterinary College,
Camden Town,
London, N.W.1.

November 20th, 1956.

Regional Petroleum Offices

The following information has been received as we go to press

Region	Address	Area covered
NORTH LONDON ...	Block C, Government Buildings, London Road, Stanmore, Middlesex	London north of the River Thames, and Middlesex, and those parts of the Counties of Essex and Hertfordshire lying within the Metropolitan Police Area
LONDON SOUTH AND SOUTH EASTERN	Government Buildings, Ruskin Avenue, Kew, Surrey	London south of the River Thames, and the Counties of Kent, Surrey and Sussex
EASTERN	Block D, Government Buildings, Brooklands Avenue, Cambridge	The Counties of Norfolk, Suffolk, Cambridge, Huntingdon, Isle of Ely, Bedford, and those parts of Herts and Essex lying outside the Metropolitan Police Area
SOUTH WESTERN ...	Block 2, Government Buildings, Flowers Hill, Brislington, Bristol, 4	Cornwall (including the Isles of Scilly), Devon, Gloucestershire, Somerset and Wiltshire
SOUTHERN ...	Block 3, Government Buildings, Whiteknights Park, Reading, Berks	Berkshire, Buckinghamshire, Dorset, Hampshire (including the Isle of Wight) and Oxfordshire
WALES	Block 2, Government Buildings, Tyglas Road, Llanishen, Cardiff	Anglesey, Brecknockshire, Caernarvonshire, Cardiganshire, Carmarthenshire, Denbighshire, Flintshire, Glamorganshire, Merionethshire, Monmouthshire, Montgomeryshire, Pembrokeshire and Radnorshire
MIDLAND	Severn House, Suffolk Street, Birmingham	Herefordshire, Shropshire, Staffordshire, Warwickshire and Worcestershire
NORTH MIDLAND...	Block 7, Government Buildings, Chalfont Drive, Nottingham	Derbyshire (excluding the boroughs of Buxton and Glossop, the urban districts of New Mills and Whaley Bridge, and the rural district of Chapel-en-le-Frith), Leicestershire, Lincolnshire, Northants (including the Soke of Peterborough), Nottinghamshire and Rutland
NORTH WESTERN...	Block E, Government Buildings, Heyhouses Lane, Lytham St. Annes, Lancs	Cheshire, Cumberland, Lancashire, Westmorland, and in the county of Derby, the boroughs of Buxton and Glossop, the urban districts of New Mills and Whaley Bridge, and the rural district of Chapel-en-le-Frith
NORTHERN ...	Government Buildings, Kenton Bar, Newcastle upon Tyne, 3	Durham, Northumberland and the North Riding of Yorkshire
NORTH EASTERN ...	Government Buildings, Ring Road, Halton, Leeds, 15	The East Riding and the West Riding of Yorkshire, and the City of York
SCOTLAND ...	Government Buildings, Broomhouse Drive, Saughton, Edinburgh, 11	The whole of Scotland
NORTHERN IRELAND	F. Barry, Esq., Victoria Barracks, North Queen Street, Belfast	

Owing to the late receipt of the above important information, the details of the present county position of the Area Eradication Plan for Tuberculosis are held over until next week.